PROJECT:	Enhanced Surveillance Services

TITLE:	Reporting of appropriate call events

SOURCE:	NORTEL 16, Place du Commerce Verdun, Québec, Canada H3E 1H6 Daniel Valois (514) 765-7954

CONTACT:	NORTEL 2201 Lakeside Blvd. Richardson, TX 75082-4399 Ronald D. Ryan (214) 684-5444 (214) 684-3744

DATE:	May 4, 1998

LOCATION:	Key West, Florida

ABSTRACT:	This contribution provides an analysis and recommendation for reporting call events.

DISTRIBUTION:	TR45.2 participants

NOTICE

1. Introduction

This contribution addresses various issues of the nine punch list items in a way which Nortel believes satisfies the evidentiary requirements of Law Enforcement, while trying to reduce costs of implementation for the benefit of both industry and government.

2. Fundamental Law Enforcement Requirements

The various forms in which the requirements were described by Law Enforcement to date include

- written contributions, ballot comments into the above process and documents such as the Electronic Surveillance Interface (ESI).

- written document used to petition FCC.

- verbal descriptions during the standardization process of J-STD-025.

In the above forms of expression of Law Enforcement requirements, the fundamental requirements are sometimes hidden behind the solution proposed — such as a message to be provided on the CDC, or as specific content to be provided on the CCC. In their petition to the FCC, Law Enforcement recognizes that some of the punch list items are solutions to their fundamental requirements as opposed to being the requirements themselves. In this same petition Law Enforcement confirms its assumptions that these solutions are the most cost effective.

Nortel believes that the standardization process provides an opportunity to discuss which solutions constitute the most cost effective. This contribution addresses the fundamental requirements identified in the punch list items and offers solutions to those issues.

Nortel also recognizes that some solutions may not be useable in all product lines of all manufacturers. However, since cost effective solutions are sought, some optionality should be put into the standard when reasonable savings can be achieved for the benefit of everyone.

3. Signaling-Based Surveillance vs Result-Oriented Surveillance

According to the current draft standard, the IAP switch needs to report any manual signaling, feature keys and other signals from the subject. In addition, the IAP switch is required to report signals it applies toward the subject, such as tones and the type of alerting. This is referred to as signaling-based surveillance. Traditionally, this was the only method of doing surveillance.

Signaling-based surveillance implies that Law Enforcement needs to receive those signals and infer from those signals what is happening to the calls. In a switch in

which only a very limited set of features are available, it is probably possible to know what a control signal (e.g., flash) can do to a given set of call legs.

However, in a modern switch, it may not be possible to determine the semantics associated with a signal such as a flash for scenarios involving uncommon features or scenarios with many interacting features. Those signals from the user can be viewed as "requests" to the switch to perform certain things, and the features may not always be able to perform the requested actions. It is therefore often very difficult to interpret the semantics of such signals.

Instead of focusing on signals that are subject to interpretation, result-oriented surveillance focuses on messaging that reports actual changes of state of calls and the parties connected to one another at any point in the call.

Nortel believes that either one of these approaches can meet the intent of the fundamental requirements of Law Enforcement. Nortel also believes that once the intent of those requirements is met, additional functionality should not be required from the industry.

4. Discussion

4.1 Reporting of internal connection changes

For some software architectures, some simple call events known to all features can be used to notify Law Enforcement of changes to call legs involving the subject. Such events allow detection when internal switching matrix connections are made and broken between the subject and his associates. However, it does not imply that an end-to-end speech path exists between the parties. For example when many switches are involved, the call may be on hold in the associate's switch, but not in the subject's switch.

The making of a two-way connection in the switching matrix implies that a two-way speech path exists between the subject and an associate from the IAP switch point of view and that these parties can talk together. When the subject is connected to a conference bridge in the IAP switch, additional two-way connections are made between the bridge and the associates.

Nortel proposes to report whenever such connections are made or broken using messages such as 'NetworkConnect' and 'NetworkDisconnect', and to include enough information so that Law Enforcement knows at all times which parties are talking together as far as is known at the IAP switch. The use of these two messages is illustrated in the following sections.

4.2 Signaling applied by the IAP switch toward the subject

According to the current stage 1 draft standard text, the IAP switch needs to report any audible in-band call progress tones that it applies.

Assuming that messages such as 'NetworkConnect' and 'NetworkDisconnect' are implemented for a given product line, Nortel believes that several of the tones

applied toward the subject during call origination do not provide any extra information to Law Enforcement. With at most a few exceptions, the combination of CDC messages defined in J-STD-025 and 'NetworkConnect' and 'NetworkDisconnect' already provide all of the information needed to understand what is happening to a call.

Moreover, it may not be possible to determine the semantics associated with a given tone for scenarios involving rarely used features or scenarios with many features. Features themselves can often be configured by the operating company to provide a variety of tones which are similar to one another.

4.2.1 Signaling during successful call origination

During successful call origination, current CDC messages seem to provide all the needed information as illustrated in Table 1. Depending on the type of line, one may or may not be able to originate a call without dial tone. Nortel believes that Law Enforcement need not be concerned whether the user needs dial tone before originating a call, and that the messages sent as listed in the last column of Table 1 provide all the information needed to understand the progress of the call.

Table 1: Basic call progress tones applied toward the subject during successful origination. Scenario: S (subject) calls B

Step	User Action	Basic Call action / event	Surveillance Feature action
1	S: off hook	apply dial tone to S	
2	S: dial digits	remove dial tone	
3	S: dial more digits	route the call to B, power ringing + display info to B audible ringback tone to S	CDC: Origination (S, B, digits) CDC: CCOpen
4	B: off hook	remove power ringing remove ringback tone to S connect S-B speech path	CDC: Answer (B) CDC: Ntwk Connect (S+B) CCC: connect to S-B call
5	talking		
6	S: hangs up	tear down the call	CDC: Release CDC: CCClose CCC: release

4.2.2 Signaling during unsuccessful call origination

In the scenario above, the audible ringback tone confirms that the call can go through. Nortel recognizes the value in providing an indication that a call fails and the reason that caused the call to fail. For example, if the subject calls a busy line then Law Enforcement could know the same information the subject has about the associate: the associate is currently on the phone. If the subject calls a blank DN (a DN that is not in service), Law Enforcement would also be informed. This kind of information can be provided in a "reason" parameter in the Release message as illustrated in Table 2. Nortel believes that the messages sent as listed in the last column of this table provide all the information needed to understand the progress of the call.

Table 2: Basic call progress tones applied toward the subject during unsuccessful origination. Scenario: S (subject) calls an invalid (blank) DN

Step	User Action	Basic Call action / event	Surveillance Feature action
1	S: off hook	apply dial tone to S	
2	S: dial digits	remove dial tone	
3	S: dial more digits	route the call to treatment for blank DN	CDC: Origination (S, -, digits) CDC: Release (reason = "treatment: blank DN")
6	S: hangs up		

The treatment applied for a given condition in a call may vary based on provisioning of the switch. Nortel believes that the actual tones or words used in the announcement do not provide any more information than is provided by the Release Reason parameter, especially since many different treatments can use the same tones.

4.2.3 Signaling during successful call termination

When a call terminates to a subject's line, the signaling applied toward the line involves power ringing (or equivalent) and display information.

The type of ringing applied to a line usually depends on either the calling DN or the called DN, both of which are available in the Termination Attempt message. By providing the subject's profile, one can determine for which calls the ringing could be different.

Nortel believes that providing the calling number display information is redundant with information already provided by the Termination Attempt message. Indeed, the calling party DN is already available in the Termination Attempt message, and the Feature Status message could report whether the subject has subscribed to the

calling name and number features. In any case, the fact that the subscriber has the feature does not imply that the telephone set is able to process it.

4.3 Signaling from the subject

Nortel believes that several of the signals from the subject to control features on a call provide no additional information about state of the call and that proper reporting of parties connected together in a call, as listed in the last column of tables 3, 4 and 5, is sufficient to understand what is happening to the call.

Table 3: Signals from the subject for feature control. Scenario: S (subject) and A are talking, Incoming call triggers Call Waiting (CWT)

Step	User Action	Basic Call / CWT action / event	Surveillance Feature action
1	S + A talking		
2	B: calls S	route call to S audible ringback tone to B CWT tone + display information to S	CDC: Term. Attempt (B, S)
3	S: flash	disconnect S-A speech path remove CWT tone remove ringback tone to B connect S-B speech path	CDC: Ntwk Disconnect (all) CCC: disconnect from S-A CDC: Answer (S) CDC: Ntwk Connect (S+B) CCC: connect to S-B call leg
4	S + B talking		
5	S: flash	disconnect S-B speech path connect S-A speech path	CDC: Ntwk Disconnect (all) CDC: disconnect from S-B CDC: Ntwk Connect (S+A) CCC: connect to S-A
6	S + A talking		
7	A: hang up	disconnect S-A speech path connect S-B speech path	CDC: Ntwk Disconnect (all) CCC: disconnect from S-A CDC: Ntwk Connect (S+B) CCC: connect to S-B
8	S + B talking		

Table 4: Signals from the subject for feature control. Scenario: S (subject) and A are talking, S initiates a 3-way call (3WC)

Step	User Action	Basic Call / 3WC action / event	Surveillance Feature action
1	S + A talking		
2:	S: flash	disconnect S-A speech path	CDC: Ntwk Disconnect (all) CCC: disconnect from S-A
2	S: calls B	(see Table 1 steps 2- 4)	(see Table 1 steps 2- 4)
4	S + B talking		
5	S: flash	disconnect S-B speech path connect S-bridge, bridge-A and bridge-B speech paths	CDC: Ntwk Disconnect (all) CCC: disconnect from S-A CDC: Ntwk Connect (S+A+B) CCC: connect to S-bridge
6	S + A + B talking		
7	A: hang up	disconnect S-bridge, bridge-A and bridge-B speech paths connect S-B speech path	CDC: Ntwk Disconnect (all) CCC: disconnect from S-bridge CDC: Ntwk Connect (S+B) CCC: connect to S-B
8	S + B talking		

Table 5: Signals from the subject for feature control. Scenario: S (subject), A and B are talking, S transfers (CXR) the call

Step	User Action	Basic Call / CXR action / event	Surveillance Feature action
6	S + A + B talking		
7	S: hang up	disconnect S-bridge, bridge-A and bridge-B speech paths connect A-B speech path	CDC: Ntwk Disconnect (all) CCC: disconnect from S-bridge CDC: Ntwk Connect (A+B) CCC: connect to A-B
8	A + B talking		

5. Proposals details on current ESS Stage 1 Service Description

5.1 Network Connect and Network Disconnect Messages

Section 2 Dynamic Party Reporting of ESS Stage 1 text should reflect the requirement to report parties that are connected together, and include the notion of the NetworkConnect and NetworkDisconnect messages.

The names of the messages have been chosen to emphasize the switch-based connection state they report (with semantics described in section 4). Below is an ASN.1 description provided for clarification of the concept.

```
NetworkConnect ::= SEQUENCE {
                    [0] CaseIdentity,
                    [1] IAPSystemIdentity OPTIONAL,
                    [2] TimeStamp,
                    [3] CallIdentity,
connectedParties    [4] SEQUENCE OF PartyIdentity
}

NetworkDisconnect ::= SEQUENCE {
                    [0] CaseIdentity,
                    [1] IAPSystemIdentity OPTIONAL,
                    [2] TimeStamp,
                    [3] CallIdentity,
                    CHOICE {
    disconnectedParties    [4] SEQUENCE OF PartyIdentity,
    remainingParties       [5] SEQUENCE OF PartyIdentity }
}
```

5.2 Clarification of requirement to report all signaling

Section 3 Access to Subject Initiated Dialing and Signaling of ESS Stage 1 text should define delivery of messages which provide sufficient information to understand all call activities as an acceptable alternative to delivering signaling described in Paragraph 1 of Section 3.

5.3 Release Reason and Flexible Notification Message

Section 4 Network Signal Reporting of ESS Stage 1 text should define delivery of messages which provide sufficient information to understand all call activities as an acceptable alternative to providing the actual network signals.

To allow reporting of reason for unsuccessful call attempts, a reason parameter is added to the release message. This release reason should also be used to report conditions where monitoring ends abnormally for a call, for example when running out of internal capacity. ASN.1 is provided below to clarify the condept:

```
Release ::= SEQUENCE {
                [0] CaseIdentity,
                [1] IAPSystemIdentity OPTIONAL,
                [2] TimeStamp,
                [3] CallIdentity,
                [4] Location OPTIONAL,
                [5] systemIdentity OPTIONAL,
releaseReason   [6] VisibleString (SIZE (1..32))
}
```

To cover cases for which other messages are not sufficient, a message such as a Notification message described below should be used to report tones, signals or display information. However, before developing a Notification message, the cases need to be thoroughly researched and its use justified. Based on the above discussion, Nortel believes there may be only limited need for a Notification Message such as with Message Waiting Indicator.

Nortel proposes a Notification message flexible enough to report any such information. It is not likely that all product lines of all manufacturers deal with tones, annoucements and display information the same way. Therefore, by providing a string to indicate what kind of event is occuring as well as additional information about that event should be able to cover all cases that need to be reported. ASN.1 is provided below to clarify the concept.

```
Notification ::= SEQUENCE {
                [0] CaseIdentity,
                [1] IAPSystemIdentity OPTIONAL,
                [2] TimeStamp,
                [3] CallIdentity,
audioVisualDisplay [4] VisibleString (SIZE (1..128))
}
```

5.4 CCC-CDC Correlation

Nortel opposes any requirement binding the time stamp in the CDC messages to the time in the AMA records. Other methods of correlation for dedicated links such as a combination of expeditiously providing CDC messages to the demark point within 'n' seconds combined with application and removal of C Tone are sufficient for correlation. However, Nortel doesn't oppose the time stamp binding as an option or alternative.

For switched surveillance circuits established and released on an individual surveillance basis, Nortel believes the CDC and CCC are inherently correlated as long as the CDC messages are expeditiously presented (within 'n' seconds) to the demark point. C Tone is not necessary for switched circuit surveillances.

5.5 Feature Status Reporting

Nortel believes that Feature Status messages should be flexible enough to allow reporting of either changes to the subject's line profile, or the profile itself.

Telecommunications Industry Association
Subcommittee TR45.2 Intersystems Operations
Enhanced Surveillance Services Ad-Hoc Group
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TITLE
ESS Comments

ABSTRACT

This contribution makes recommendations for expanding the ESS working document to more fully satisfy FBI requirements.

SOURCE

F. W. Bowen   630-713-7401

Lucent Technologies
Bell Labs Innovations
(Formerly AT&T Network Systems)

RECOMMENDATION

Modify the ESS working document as recommended.

If we look to the ESI for initial guidance for Stage 1 requirements, the ESI transitions quickly from a few general requirements, into interface definitions and messages that are more representative of a particular implementation than general service descriptions. Work will be required to build the appropriate bridge between the current Stage 1 service descriptions to the appropriate Stage 1, Stage 2 and Stage 3 constructs.

The ESI Functional Reference Model describes the J-STD-025 functional entities within the context of the Telecommunications Carrier (TC) Network, and not individual Intercept Access Points (IAPs) (see ESI Functional Entity Reference Model). Most requirements refer to the TC and not IAPs. J-STD-025 speaks more to serving systems and specific IAP platforms (the target's IAP).

Two key ESI requirements are :

R7-1: All SIMPLE messages shall be delivered for call/service events performed by the subject or on the subject's behalf. This includes call-associated event messages, ...

R7-2: SIMPLE messages shall be generated by the appropriate intercept access point (IAP) detecting the event of interest, and shall be sent over the CDC to the LEA.

Neither requirement limits activity to "the target's IAP". It is clear that the ESI never limits event reporting requirements to the "subject's IAP" or the "accessing switching system".

Further, the ESI states:

"The scope of the first issues of this document is to address law enforcement interface needs for the following telecommunications services and technologies:

- (...) POTS
- Centrex services
- Custom Calling Features
- Cellular services
- (...) IN services
- (...) AIN services
- (...) ISDN BRI   "

With this in mind, the current Stage 1 service descriptions need to be broadened and expanded.

In addition, the current Stage 1 service descriptions do not accurately and exhaustively enumerate triggering call states and call events, as was done with J-STD-025.

SPECIFIC STAGE 1 COMMENTS

The following comments include a first attempt at exhaustively enumerating intercept services (features) that may not be covered by J-STD-025, and that can be interpreted as being within the intended scope of the ESI. They should be carried within ESS until FBI contributions exclude them, or limit their applicability, or they are shown to be addressed by J-STD-025.

These comments are based on the working text agreed to by everyone as of the end of the last (Tucson) ESS meeting.

A new term "associated switch" defines the switch serving an associate to a communication involving a target. Where the lone term "associate" is used, it implies an associate on the target's IAP(switch).

4.3.x7 Associate Originated Multi-party Call - Continuing Associated Switch Associate Call Content After Target Permanently Disconnects

Monitor an associate's multi-party service when two or more associates are allowed to converse at an associated switch after the subject has permanently disconnected.

4.3.2 Dynamic Party Reporting

Delete "to extent known to the accessing switching system" in both paragraphs. "Accessing switching system" not a defined term.

Delete call waiting from list. Call waiting is not a multi-party conversation, and does not use multi-party resources.

This text seems to assume a whole call model and not a half call model. It also does not distinguish between subject and associate initiated party changes, or associate initiated changes at an associated switch.

Change the title to: **Target Initiated Multi-Party Call Dynamic Party Reporting**

Reword the text to indicate that the dynamic party reporting occurs as a result of subject actions.

Add five more sections, each with similar text using associate and not subject, and associated switch where appropriate:

4.3.x8 Associate Initiated Multi-Party Call Dynamic Party Reporting

4.3.x9 Associated Switch Associate Initiated Multi-Party Call Dynamic Party Reporting

4.3.x10 Target Controlled Call Waiting Dynamic Party Reporting

4.3.x11 Associate Controlled Call Waiting Dynamic Party Reporting

4.3.x12 Associated Switch Associate Controlled Call Waiting Dynamic Party Reporting

4.3.3 Access to Subject Initiated Dialing

Change the section title to "**Access to Subject Initiated Signaling**". This is more descriptive of the service as described in the text.

Delete "to the extent known to the accessing switching system".

Delete sentence "Keys that are reported with the Origination message need not be redundantly reported." Different software modules may be involved, and the coordination required to avoid redundancy will cause unnecessary complexity. Each module that receives or processes subject signaling should autonomously report that via a CDC message.

Move last paragraph regarding post cut-though digits to Post Cut-Through Reporting. Target IAP makes no use of these digits as they are distinguished from the signaling of the first paragraph.

Add two additional sections with similarly descriptive text for associate and associated switch associate:

4.3.9 Post Cut-through DTMF Reporting

To be added: redirection at terminating associate

To be added: AIN Call Control and Feature Reporting

To be added: IN Call Control and Featuring

To be added: CLASS Call Control and Featuring